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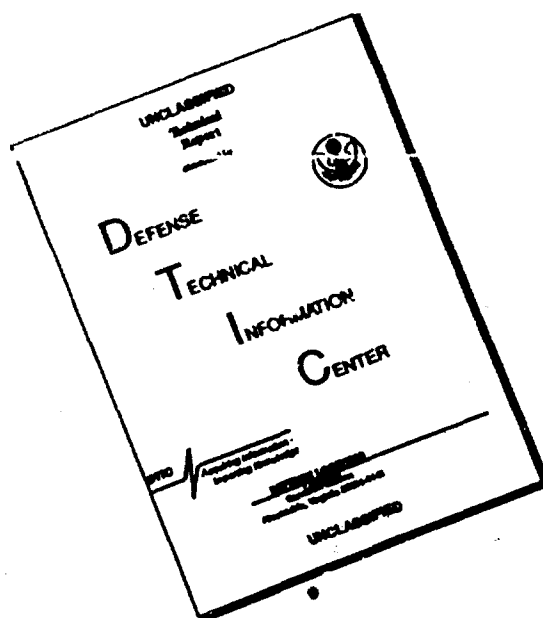
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COLLOQUIUM AND SYMPOSIUM ON THE PROBLEM OF TURBULANCE

[Following is the translation of an article by A. M. Obukhov, Member Correspondent of the Academy of Sciences SSSR, in Vestnik Akademii Nauk SSSR (Herald of the Academy of Sciences USSR), Vol 31, No 12, December 1961, pages 102-103.]

A colloquium and a symposium on the problem of turbulence, both quite similar in their main themes, took place in Marseilles from 26 August to 9 September. They constituted the first wide international meeting of specialists working on this difficult problem. The colloquium considered major questions concerning the mechanics of turbulence and experimental data which had been obtained under laboratory conditions. The symposium reviewed the major problems of turbulence and their relation to geophysics. The symposium was convened by the International Geodesic and Geophysical Unions and by the International Union of Theoretical and Applied Mechanics with the support of French scientists.

The problem of turbulence is a complex one. The majority of natural currents (rivers, atmospheric air currents) as well as liquid currents in pipes, as a rule, are turbulent, i.e. they are accompanied by an internal disorderly whirling movement which conditions the mixture. The study of this phenomenon requires the united efforts of aerohydro-mechanics, specialists in the theory of probability and theoretical physics. In recent years much experimental material in the study of the structure of turbulent currents has been accumulated in meteorology and physical oceanography.

The reports at the symposium and the colloquium were centered around several main themes. Great attention was given to the problem of turbulent diffusion which now interests theorists as well as practicing meteorologists, and to questions on the exchange in a homogeneous turbulence, for which at the present time the main results remain those obtained by A. N. Kolmogorov in 1941. There was a discussion of the interesting experimental material on free turbulence, occurring on the border of two currents and two jets.

The main result of the discussion was the systematization of rich observational material on spectra and other characteristics of turbulence which have been obtained in the atmosphere and in the sea. These observations fully confirm the application of the main conclusions in the theory of local-isotope turbulence, developed by A. N. Kolmogorov, regarding natural currents. The Canadian scientist, R. V. Steward, has conducted the most minute measurements in the ocean. He succeeded in penetrating into such details of the microstructure of marine turbulence, as exist under the influence of viscosity.

This initial research confirmed the theoretical prediction about

the magnitude of the "internal scale" of turbulence, which characterizes the dimensions of minimal agitation present in a developed turbulent current (atom of turbulence type). In the sea the magnitude of this scale has an order of 1 centimeter.

Regarding new problems relating to geophysical applications, there was advanced the study of turbulence in different environments, as for example, the atmosphere with a determined distribution of average temperature according to altitude. The development of turbulence in this instance is accompanied by pulsations of temperature and density which are of great interest to radio physicists (questions concerning the dispersal of ultra short radio waves in a real atmosphere). Some concrete problems were formulated for the near future. For the further advancement of theory an analysis of accumulated great factual material is necessary.

Together with the discussions on the reports included on the agenda, lively discussion was held on the various aspects of the given problem during the recesses between the sessions. These contributed a strengthening of creative contact among representatives with the most varied specialties--aerohydraulics, mathematicians, physicists-theorists, as well as geophysicists, working in the field of study of the atmosphere and world ocean.

During their stay in Marseilles, members of the Soviet delegation became acquainted with the Institute of Statistical Mechanics of Turbulence which officially opened on 2 September. One of the problems of the Institute was the study of general questions on the mechanics of a turbulent current; the trend of the work was mainly experimental. The Institute has at its disposal a good experimental base--aerodynamic pipes of different size (including a pipe for supersonic velocities), as well as modern electron technology for the measurement and analysis of pulsation.